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EFFICIENCY IN FRUIT MARKETING

Marketing Costs for Deciduous Fruits

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CALIFORNIA AGRICULTURAL EXPERIMENT STATION
GIANNINI FOUNDATION OF AGRICULTURAL ECONOMICS

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FOREWORD

This report is the first of a series aimed at improved efficiency and lowered costs in the local marketing and packing of deciduous fruits. The reports are directly concerned with shipping-point costs for Pacific Coast apples, pears, and table grapes, but many of the findings apply to other fruits and vegetables. Shipping-point costs have been nearly as large as average returns to farmers during the postwar period and considerably larger than farm returns in years of low prices such as 1949. For California, Washington, and Oregon, these costs for apples, pears, and table grapes total about $65 million per year.

The reports to follow are written primarily for owners and managers of packing houses and deal with the effects of equipment, plant layout, and work methods on efficiency and costs. Standards of efficient operation will be provided so that the manager can check his own operation against the experience of the industry and so improve his efficiency and lower his costs of operation. The reports emphasize the results of the research studies and not their technical details; such details will be made available in other forms at a later date.

These studies were made co-operatively by the Giannini Foundation of Agricultural Economics, California Agricultural Experiment Station, and the Bureau of Agricultural Economics, U. S. Department of Agriculture. Active interest and co-operation on the part of the industry have been essential to their completion, and this assistance is gratefully acknowledged. The studies were made under the authority of the Research and Marketing Act.

EFFICIENCY IN FRUIT MARKETING

Marketing Costs for Deciduous Fruits

R. G. Bressler[1]

FOOD MARKETING COSTS

Before the food products of our farms can be consumed, they must pass through the hands of a number of middlemen or marketing agencies. These agencies assemble the food products from farms, pack, process, store, and ship them from producing regions to central markets and on to terminal wholesale markets, and distribute them through wholesalers and jobbers to retail stores in all localities and so eventually to family kitchens. The appropriate channels for any particular product will vary, depending upon such factors as the location of producing areas and major markets, the bulkiness and perishability of the product, and the amount of processing required. In all cases, however, such services must be performed if food is to be produced and moved to urban consumers. The development of the industrialized economy of the United States would have been impossible without the growth of an elaborate marketing system that permits food production to be located where soils, climate, and other physical and economic factors create advantages and makes these products available at cities where, and when, and in the form required.

Hauling, storing, processing, and selling food products require the use of labor, machinery, buildings, fuel, and power. These marketing services are costly to perform and constitute an important use of the nation's resources. Figure 1 shows recent trends in the total food marketing bill for the United States and indicates that by 1950 these charges amounted to more than $20 billion--roughly 10 per cent of our total national income.

Expressed in another way, these marketing costs appear to be at least as important as the original production expenses on the farm. Figure 2 shows the distribution of the consumer's food dollar between the farmer and the middleman. During most of the period since 1915, food marketing charges have absorbed more than half of the consumer's dollar spent on all foods. This was especially pronounced during the 1930's when the prices

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[1] Professor of Agricultural Economics and Agricultural Economist in the Experiment Station and on the Giannini Foundation.

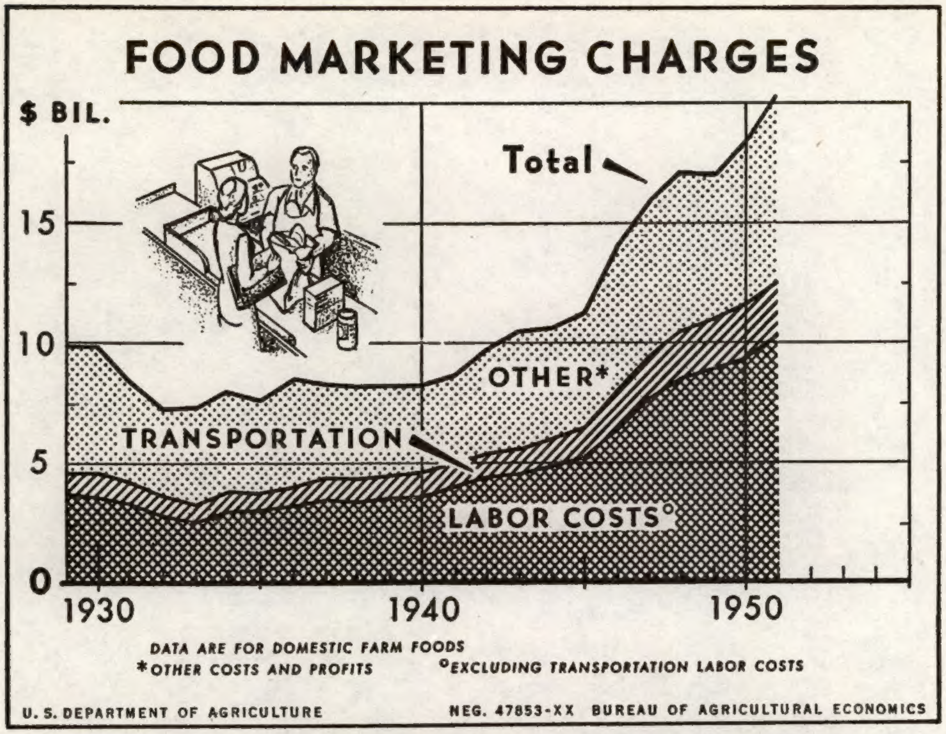


Figure 1—Trends in the total bill for food marketing in the United States, 1930–50.

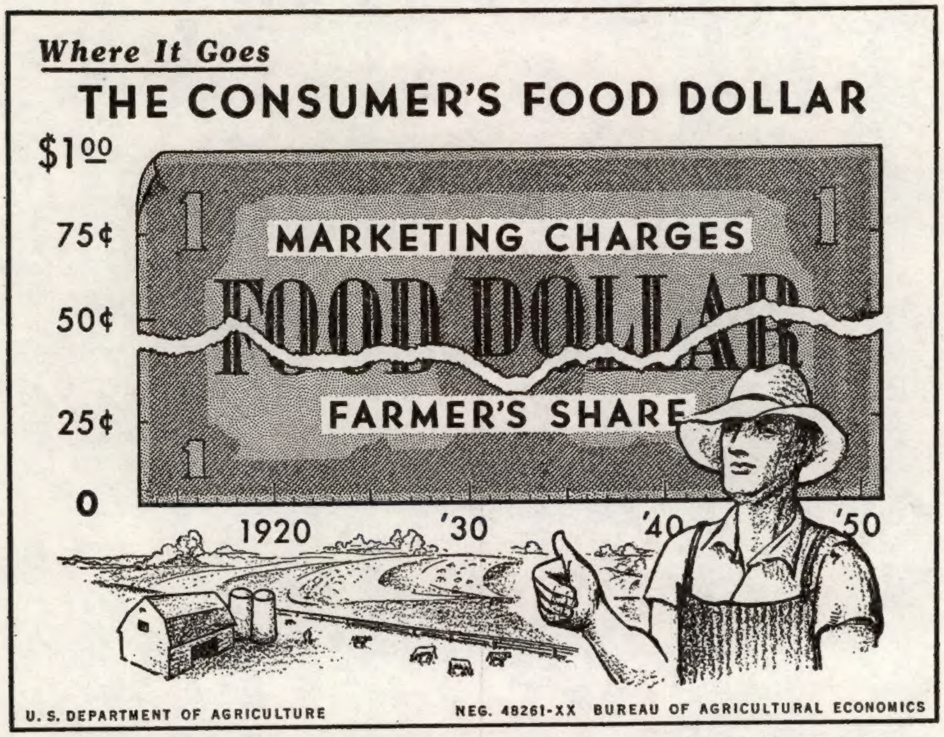
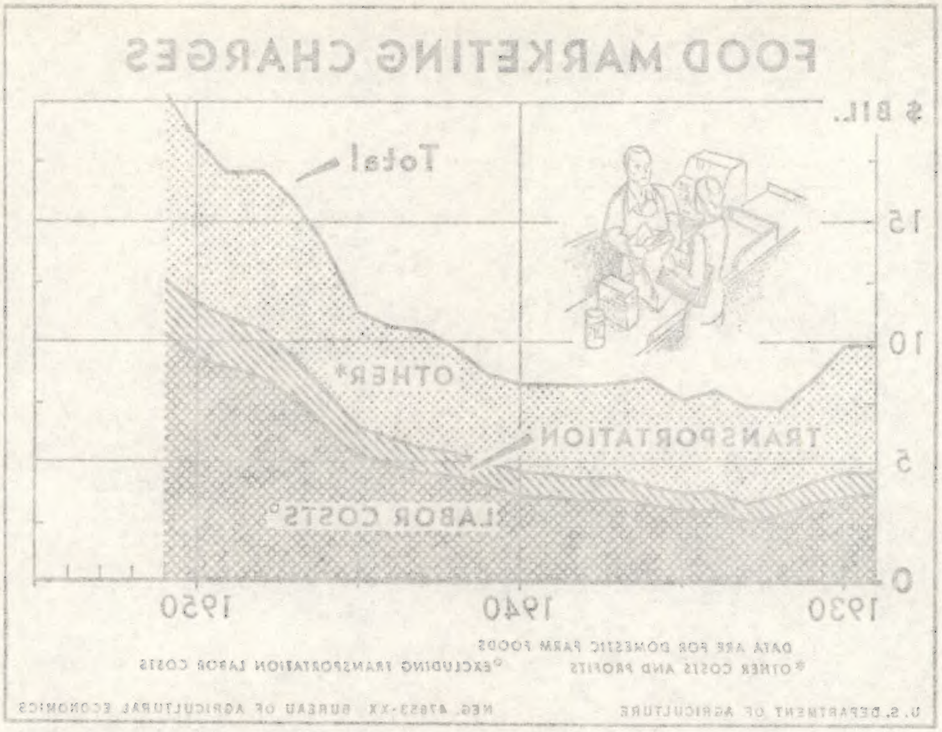


Figure 2—The importance of marketing charges in the consumer's food dollar, 1913–51.



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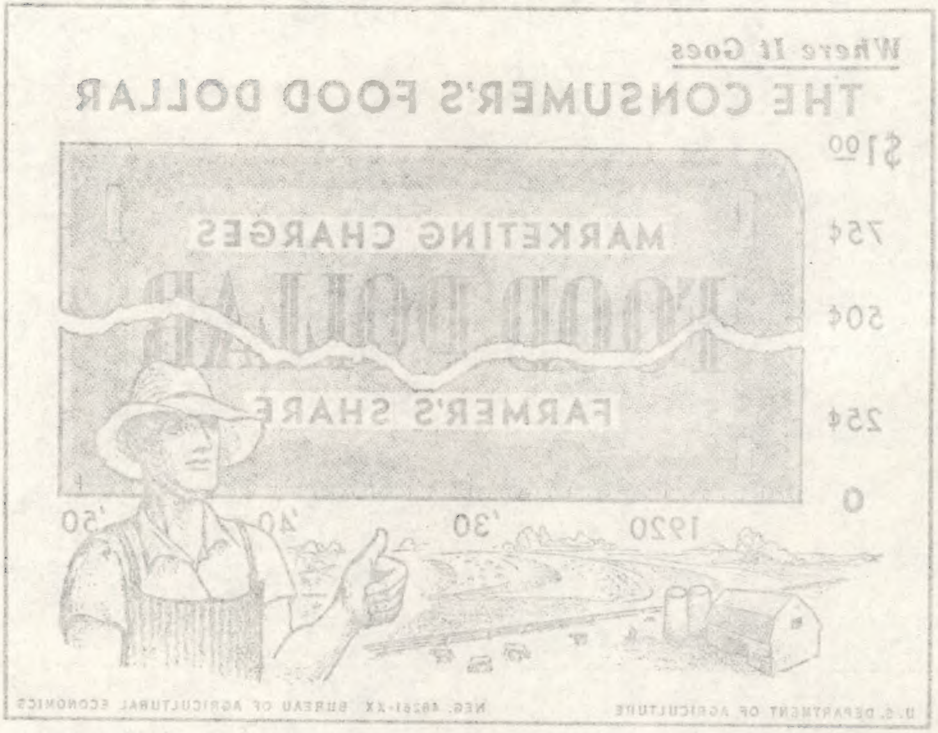

Figure 2—The importance of marketing charges in the consumer's food dollar, 1913–51.

received by farmers declined more rapidly than did marketing margins. The relatively prosperous times during the war and postwar period have reversed this, however, and at present the farm and marketing shares of the consumer's dollar are about equal.

Marketing Costs for Pacific Coast Deciduous Fruit

Because of their bulk, perishability, and the long distances to major markets, marketing costs for deciduous fruits produced in the three Pacific states are relatively more important than the average for all food products. The 1946-1950 average prices for Washington apples and California fresh pears and table grapes are summarized in Table 1. These reported prices indicate that Washington apple growers received at the packing house door an average of only 39 per cent of the price paid by wholesalers on eastern auction markets while California pear and grape growers received 43 and 32 per cent, respectively. Reports of retail prices paid for these three fruits are not regularly available, but a 1947-48 study indicated that the wholesale-retail price spread for Washington Delicious apples averaged $1.74 per box in Chicago while a 1948 study in California markets found a

TABLE 1

Average Prices for Washington Apples, California Fresh Pears, and California Table Grapes, 1946-1950[a]

Basis	Washington apples	California fresh pears	California table grapes
	northwestern box	standard box	28-pound lug
Equivalent on-tree or on-vine	$1.16	$1.59	b/
First delivery point (farmer's share)	1.44	1.92	$0.96
F.o.b. shipping point	2.58	b/	b/
Eastern auction markets	3.65	4.44	3.01
Farmer's share of auction price	39 per cent	43 per cent	32 per cent

a/ Calculated from prices reported by the U. S. Department of Agriculture.

b/ Not available.

wholesale-retail price spread of $1.12 per lug for table grapes.[1] If these price spreads are added to the auction prices reported, it would appear that the farmer received about 26 per cent of the consumer's dollar spent for Washington apples and less than 20 per cent of the consumer's dollar spent for California table grapes.

The major components of marketing costs between the grower and eastern auction markets are indicated by the results of several studies summarized in Table 2 and Figure 3. It should be noted, however, that the studies are not exactly comparable, nor are the reported costs and charges in complete harmony with the price spreads discussed above. The studies indicate that marketing charges from tree or vine through eastern auction markets averaged about $2.52 for a northwestern box of apples, $3,18 for a standard box of California pears, and $1.96 per lug of grapes. Although the importance of individual components varied somewhat for the three fruits, picking and hauling to the packing house averaged approximately 11 per cent of the auction price, container costs about 17 per cent, and other packing costs about 17 per cent. Reported charges for other shipping-point services such as loading, precooling, warehousing, and selling ranged from 6 to 15 per cent and averaged about 10 per cent of the auction price. Transportation charges to eastern markets, including freight, standard refrigeration, and federal taxes, averaged about 37 per cent of the auction return while charges at the auction market were reported to range from 4 to 12 and averaged about 8 per cent of the auction price.

It would appear, then, that the price received for these Pacific deciduous fruits at eastern auctions is divided into three approximately equal shares--one share to the grower, one share for marketing costs and charges at the local shipping point, and one share to cover transportation and auction charges. It is also important to realize that the reported marketing costs and charges are for past seasons and that the trend in costs has been increasing. Transportation and refrigeration rates were relatively constant

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[1] Farm-to-Retail Margins for Washington Delicious Apples Marketed in Chicago, 1947-48 Season, by H. H. Reizenstein and H. W. Bitting, U. S. Department of Agriculture, Bureau of Agricultural Economics, Agriculture Information Bul. No. 6, December, 1949, and California Thompson Seedless Grapes: Marketing Channels and Farm-to-Retail Margins, 1948, University of California Agricultural Experiment Station, Giannini Foundation Mimeographed Report No. 115, June, 1951.

TABLE 2

Reported Marketing Costs and Charges for Washington Apples, California Fresh Pears, and California Table Grapes

	Washington[a] apples 1947-48	California[b] fresh pears 1950-51	California[b] table grapes 1950-51
	northwestern box	standard box	28-pound lug
Pick and haul to packing house	$0.28[c]	$0.33	$0.23
Shipping-point charges	1.21	1.42	0.78
Packing	$0.46	$0.60	$0.31
Container	0.38	0.60	0.36
Other[d]	0.37	0.22	0.11
Freight and refrigeration[e]	0.94[f]	1.12	0.72
Auction market	0.09	0.31	0.23
Total	2.52	3.18	1.96

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[a] Farm-to-Retail Margins for Washington Delicious Apples Marketed in Chicago, 1947-48 Season, by H. H. Reizenstein and H. W. Bitting, U. S. Department of Agriculture, Bureau of Agricultural Economics, Agricultural Information Bul. No. 6, December, 1949. For purposes of comparability, adjustments as noted below have been made.

[b] Based on studies made available by Harold Angier, California Grape and Tree Fruit League.

[c] The study reported a cost of $0.11 for hauling only. This has been increased to $0.28 to correspond to the on-tree to packing-house door price spread reported in Table 1.

[d] Includes loading, precooling and, in the case of the Washington study, storage and local selling expenses.

[e] Includes average rates to eastern auctions for freight, standard refrigeration, and federal transportation taxes. Limited refrigeration services are available at lower rates.

[f] The original study reported $0.73 for freight only. This has been increased to allow for standard refrigeration.

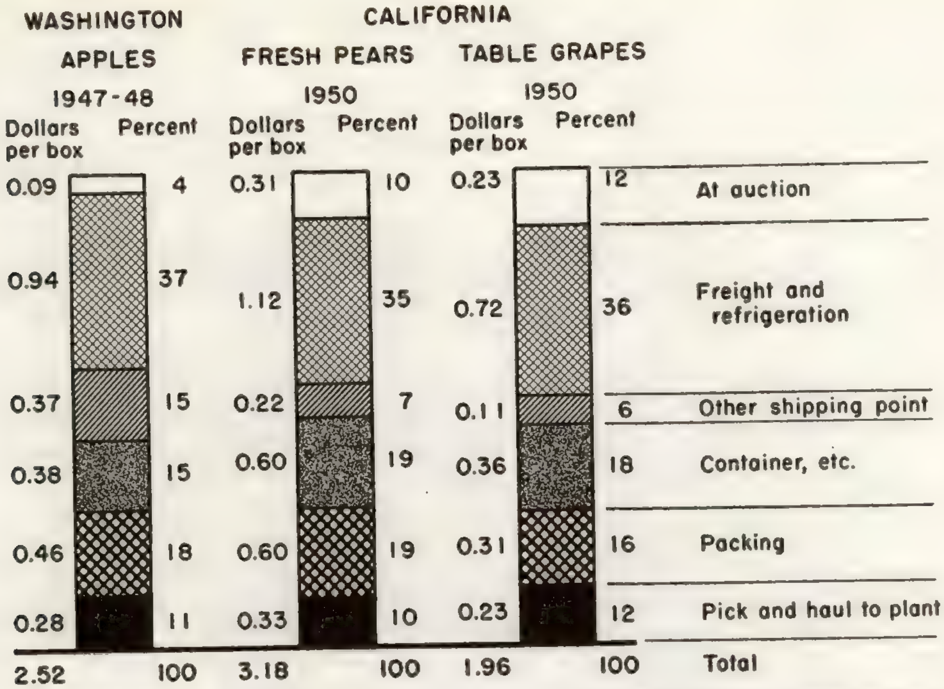

Figure 3—Approximate distribution of expenses from tree or vine through Eastern Auction markets, Washington apples 1947–48 and California fresh pears and table grapes 1950.

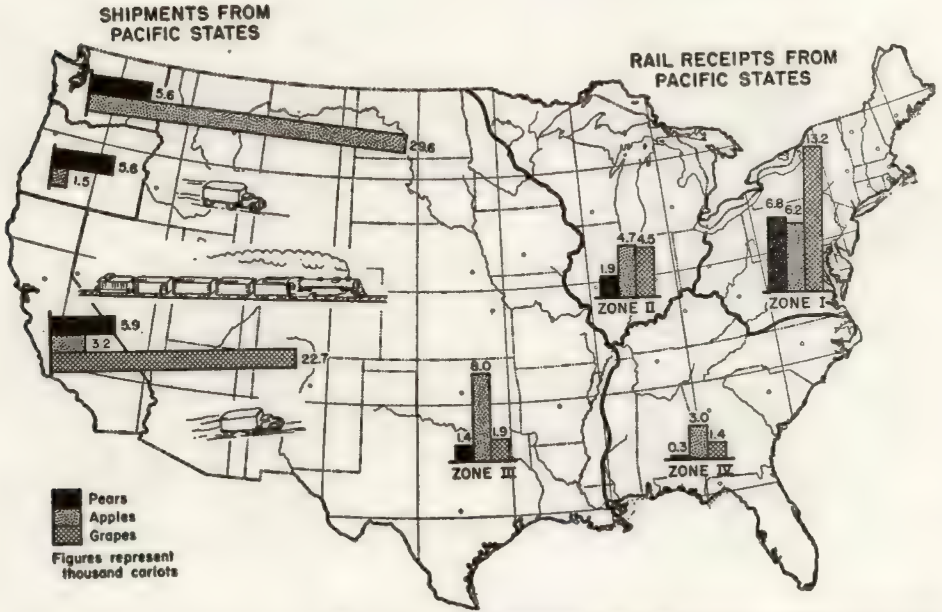

Figure 4—Approximate annual shipments and destinations of fresh pears, apples, and table grapes shipped from Washington, Oregon, and California during the post-war period.

during the war period but have increased nearly 30 per cent since the war. The average hourly earnings of labor in California fruit and vegetable processing establishments are now about 150 per cent above prewar levels--having increased from an average of $0.56 per hour in 1940-41 to $1.37 during 1950. These increases have had a direct impact on local marketing costs. Finally, marketing charges are relatively inflexible and so become increasingly important when farm prices decline. In 1949, for example, auction prices declined while marketing charges remained about constant. As a result, returns to farmers were only 67 per cent of the 1946-1950 average for Washington apples, 41 per cent for California fresh pears, and 57 per cent for California table grapes.

Not only are marketing costs for these deciduous fruits important on a per-box basis, but the total volume of shipments is large. Apples, fresh pears, and table grapes are the most important deciduous fruits produced and shipped from the Pacific Coast states. These three states have an average commercial apple production of some 42 million bushels, with Washington alone accounting for 31 million bushels. The three states represent about 37 per cent of the total commercial apple crop of the United States, and reported shipments average more than 33,000 carlots per year (Table 3 and Figure 4). The three Pacific Coast states contribute about equally to pear production and account for more than 80 per cent of the United States crop. Annual shipments of pears average between 5,000 and 6,000 carlot equivalents from each state, and the three-state total averages more than 17,000 carlots per year. California table grape production accounts for more than 90 per cent of the United States total, and annual shipments average nearly 23,000 carlots.

Data as to the geographic distribution of these shipments are incomplete, but the approximate pattern may be judged from the rail unloads reported for 100 major cities in the United States. These data have been summarized by major transportation zones and are included in Table 3 and Figure 4. For pears and grapes, where competition from other producing areas is insignificant, by far the greatest proportions of shipments go to destinations in the heavily populated areas in the northeastern and north central zones. The northeastern zone accounts for about 65 per cent of all reported unloads for both pears and grapes, the north central industrial zone for an additional 20 per cent, while the balance--about 15 per cent--goes to the southeastern zone and the area

TABLE 3

Reported Shipments and Rail Carlot Unloads at 100 United States Cities Pacific Coast Apples, Fresh Pears, and Table Grapes[a]

Shipments in carlot equivalents[b]				Unloads in carlot equivalents[c]			
State of origin	Apples	Fresh pears	Table grapes	Zone[d] where unloaded	Washington[e] apples	All[f] pears	California[g] table grapes
Washington	29,600	5,600	--	I	6,200	6,800	13,200
Oregon	1,500	5,600	--	II	4,700	1,900	4,500
California	3,200	5,900	22,700	III	3,000	300	1,400
				IV	8,000	1,400	1,900
Total	33,300	17,100	22,700		21,900	10,400	21,000

a/ Based on reports by the U. S. Department of Agriculture. All figures have been rounded to nearest 100 carlots.

b/ Averages for five seasons 1946-1950. Shipment reports include rail plus partial reports on truck movements, but truck reports are incomplete.

c/ Based on rail unloads in 100 United States cities and, so, incomplete with respect to truck movements and unloads in markets not included in the 100-city report.

d/ Zone I corresponds to south coast freight territories A and B and includes the northeastern states, Maryland, Virginia, West Virginia, the District of Columbia, and most of Ohio.

Zone II corresponds to freight territories C, Cl, and D and includes Michigan, Indiana, Illinois, Wisconsin, and parts of Ohio and Minnesota.

Zone III corresponds to freight territories K, Kl, L, and M and includes most of the area east of the Mississippi River and south of Zones I and II.

Zone IV includes the balance of the country--for practical purposes, the area west of the Mississippi River.

e/ Averages for four seasons 1946-1949.

f/ Averages for three seasons 1947-1949 for rail unloads from all states. As the three Pacific states accounted for more than 97 per cent of all pear shipments by rail in this period, the reports may be taken as indicative of the pear distribution of Pacific Coast pears.

g/ Not available for earlier years, so, based on the average for two seasons 1949-50.

west of the Mississippi River. Although this picture is somewhat distorted by the absence of truck shipments, the dominant importance of the northeastern markets is clear.

The distribution of western apples differs materially from the patterns for pears and grapes for here the West is in direct competition with important producing areas in the central and eastern regions of the country. As a consequence, rail unloads of Washington apples show only 28 per cent in the northeastern zone, 22 per cent in the north central zone, 14 per cent in the southeastern zone, and 36 per cent in cities west of the Mississippi.

The figures as to the volume of shipments can be combined with the previously presented estimates of marketing charges per box to obtain a rough estimate of the total marketing bill for these Pacific Coast products. The three-state totals are equivalent to approximately 12 million boxes of pears, 24 million boxes of apples, and 25 million lugs of table grapes annually. These shipments represent a marketing bill from farm through eastern auctions of about $130 million divided almost equally between shipping-point functions and transportation and auction charges.

EFFICIENCY IN MARKETING

Marketing, like any other productive activity, is a costly process and constitutes an extremely important sector of our economy. As indicated in the preceding pages, about half of the consumer's dollar spent for food goes to cover marketing costs and charges. In the case of deciduous fruits produced in the three Pacific states and shipped to eastern markets, a much larger proportion of the consumer's dollar goes to marketing services. As a consequence, the efficiency with which the marketing job is performed is of importance to marketing agencies, producers, consumers, and all of our society.

In this respect, marketing activities resemble any other form of production. The manager of an individual marketing firm is interested in increased efficiency because any resultant reduction in costs may place him in a more advantageous competitive position in the purchase and sale of his product and further enhance the possibility of increased profits. Farmers can expect that improvements in marketing efficiency will be reflected in lowered charges and narrowed price spreads. These will mean increased prices at the farm and greater sales to consumers. Consumers view improvements in marketing as one method of reducing the high cost of living and increasing their living

standards for part of any savings is eventually reflected to consumers in terms of larger supplies and lower prices.

These are the direct consequences of improvements in marketing efficiency, but the impact on the whole economy is also important. In its broad aspects, the efficiency of our economy is basically a function of the allocation of such resources as labor, land, and capital goods among alternative uses in such a way that the aggregate product satisfies as completely as possible the wants and demands of our population. This allocation is accomplished for the most part through the marketing system for the prices that are established by this marketing mechanism are the guides that direct more or less resources into any given area. If society wants more of a particular commodity or service (and relatively less of others), the bidding for available supplies in the market will force prices up. The immediate impact of the higher prices is to increase net returns to producers and handlers of the product. Higher profits over time will induce existing firms to expand their output and also will encourage some firms to abandon other less profitable enterprises and to enter this industry.

Increased marketing efficiency thus has a dual effect on this aspect of national efficiency. First, improved efficiency will result in a direct reduction in the amount of resources required to perform the marketing functions and a consequent release of resources for other desirable uses. Second, increased efficiency brings producers and consumers into more intimate contact and so helps the market to operate more efficiently in creating prices and directing the flows of resources into production and of commodities and services into consumption.

The California-BAE Studies of Marketing Efficiency

Growing realization of the importance of marketing and of its strategic role in the efficiency of the whole economy has led to a gradual expansion in the study of marketing costs and efficiency. This trend was given a substantial boost when Congress passed the Research and Marketing Act as part of the Agricultural Marketing Act of 1946. Under this legislation, increased public support was given to state and federal agencies and to the state agricultural experiment stations for new and expanded studies of the costs and efficiency of agricultural marketing.

Part of the funds under the Research and Marketing Act was specifically appropriated to encourage co-operative effort among the U. S. Department of

Agriculture and the several state experiment stations. As a result of this allocation--and reflecting the well-established interest of both agencies in this field--the California Agricultural Experiment Station and the United States Bureau of Agricultural Economics have been co-operating on a long-range study of the costs and efficiency of marketing deciduous fruits. The importance of shipping-poing costs, plus the probable interest of the local industry in applying research results to improve efficiency, led to the selection of this area. A number of California apple and pear packing firms co-operated with the project during the 1949-50 period, and the work was expanded to include table grapes during the 1951 season.

Selected costs of operating sample pear packing houses are summarized in Tables 4 and 5. These cost estimates are not season averages of the accounting costs for the several plants. To focus attention on internal efficiency, costs were adjusted to represent uniform conditions with respect to wages, hours of operation, type of container, and length of season. Labor costs were standardized to eliminate the effects of differences in wages paid by the individual plants. All calculations were based on a normal 8-hour day with average rates of operation. Fixed costs were based on estimates of current replacement values for buildings and equipment, uniform procedures for allocating between packed and cannery fruit, and the assumption of 30 full packing days in a season. Finally, all costs were expressed relative to boxes containing 48 pounds net weight of pears.

These estimates emphasize the general importance of the area selected for study--costs averaged about $1,00 per box of packed fruit for these houses. In addition, the estimates suggest the relative importance of labor and other costs in the total and of major operations within the labor cost component. In broad terms, labor costs account for roughly 30 per cent of total costs, operating and administrative costs for 10 per cent, packing boxes and materials 50 per cent, and fixed costs for buildings, land, and equipment about 10 per cent. Material costs, although very important, are not subject to great modification or control by management, discounting any major change in type of package. Of the remaining costs, labor is by far the most important, and problems of labor efficiency occupy a correspondingly important place in the research studies.

Table 4 also suggests the possibilities for cost reductions through increased efficiency. For these plants, the selected costs for receiving

TABLE 4

Selected Costs of Packing Fresh Fruit in Eleven California Pear Packing Plants, 1950[a]

Plant	Standard boxes per hour[b]	Cost per standard box equivalent (dollars)												
		Direct labor costs[c]												
		Receive and dump	Grade	Pack[d]	Packaging services[e]	Truck and load	Label and box making[d]	Supervision and misc.	Subtotal	General operating[f]	Office and administration	Materials[g]	Fixed costs[h]	Grand total
L	312	0.034	0.048	0.155	0.064	0.049	0.020	0.022	0.392	0.046	0.059	0.511	0.101	1.109
M	277	0.020	0.035	0.155	0.034	0.022	0.018	0.011	0.295	0.014	0.037	0.511	0.083	0.940
N	712	0.031	0.033	0.155	0.065	0.031	0.020	0.022	0.357	0.033	0.045	0.511	0.090	1.036
P	662	0.019	0.037	0.155	0.039	0.014	0.020	0.020	0.304	0.041	0.035	0.511	0.144	1.035
Q	606	0.024	0.024	0.155	0.039	0.023	0.020	0.033	0.318	0.037	0.049	0.511	0.136	1.051
R	523	0.022	0.027	0.155	0.051	0.032	0.020	0.021	0.328	0.014	0.049	0.511	0.085	0.987
S	623	0.019	0.030	0.155	0.077	0.014	0.020	0.015	0.330	0.031	0.044	0.511	0.078	0.994
T	358	0.022	0.030	0.155	0.063	0.027	0.020	0.017	0.334	0.031	0.044	0.511	0.088	1.008
U	1,062	0.021	0.025	0.155	0.029	0.011	0.019	0.015	0.275	0.028	0.043	0.511	0.087	0.944
V	935	0.011	0.021	0.155	0.026	0.013	0.020	0.010	0.252	0.025	0.037	0.511	0.098	0.923
W	817	0.016	0.022	0.155	0.044	0.012	0.019	0.021	0.285	0.029	0.048	0.511	0.108	0.981

[a] Computed on the basis of 8-hour days with typical hourly rates of output. As such, these cost estimates will differ from average costs for a season.

[b] Typical hourly rates of output in terms of 48-pound boxes.

[c] Adjusted to reflect uniform wage rates typical for the industry.

[d] Estimated on the basis of usual "piecework" payments.

[e] Includes lidders, checkers, stampers, setoff men, and bin boys.

[f] Includes general supplies, fuel, power, light, and miscellaneous costs.

[g] Standardized to reflect uniform type of package. Actual reports show minor variations in this item.

[h] Based on thirty 8-hour days of operation per season, current replacement values for buildings and equipment, and uniform methods of allocating plant and equipment costs between fresh and cannery fruit.

TABLE 5

Selected Costs of Handling Cannery Fruit in Eleven California Pear Packing Plants, 1950[a]

Plant	Tons per hour[b]	Costs per ton of cannery fruit (dollars)								
		Direct labor costs[c]					General operating[d]	Office and administration	Fixed costs[e]	Grand total
		Receive and dump	Grade	Package, truck, and load	Supervision and miscellaneous	Subtotal				
L	1.9	1.42	1.99	3.60	0.91	7.92	1.93	2.44	2.49	14.78
M	5.4	0.94	0.76	2.49	0.43	4.62	0.46	1.54	1.93	8.55
N	2.0	1.29	1.38	2.09	0.45	5.21	1.36	1.89	2.88	11.34
P	2.1	0.78	1.52	1.25	0.54	4.09	1.70	1.47	4.08	11.34
Q	--	--	--	--	--	--	--	--	--	
R	9.9	0.90	1.02	1.30	0.79	4.01	0.60	2.04	2.09	8.74
S	7.3	0.81	1.25	2.55	0.55	5.16	1.29	1.82	1.55	9.82
T	13.9	0.90	0.52	1.26	0.70	3.38	1.28	1.82	1.61	8.09
U	3.9	0.85	1.05	1.05	0.43	3.38	1.18	1.80	2.36	8.72
V	10.7	0.45	0.89	1.10	0.30	2.74	1.02	1.56	2.18	7.50
W	12.0	0.68	0.93	1.41	0.76	3.78	1.22	1.99	2.24	9.23

[a] Computed on the basis of 8-hour days with typical hourly rates of output. As such, these cost estimates will differ from average costs for a season.

[b] Typical hourly rates of output in tons of cannery fruit.

[c] Adjusted to reflect uniform wage rates typical for the industry.

[d] Includes general supplies, fuel, power, light, and miscellaneous costs.

[e] Based on thirty 8-hour days of operation per season, current replacement values for buildings and equipment, and uniform methods of allocating plant and equipment costs between fresh and cannery fruit.

and dumping labor range from 1.1 to 3.4 cents per box of packed fruit, grading labor from 2.1 to 4.8 cents, packaging services from 2.6 to 7.7 cents, trucking and loading from 1.1 to 4.9 cents, and supervisory and miscellaneous labor costs from 1.0 to 3.3 cents per box. Operating costs--covering such items as supplies, fuel, light, and power--range from 1.4 to 4.6 cents per box while administrative and office costs range from 3.5 to 5.9 cents per box. Fixed costs for land, buildings, and equipment range from 7.8 to 14.4 cents per box even under the assumptions of current replacement values of a uniform length of season.

Three other aspects of improving efficiency are suggested by Table 4. First, even in the most efficiently operated houses, efficiency can be improved in some operations and, conversely, houses with relatively high total costs usually are fairly efficient in some operations. Second, the table suggests that plant volume is an important factor, and this is one of the aspects of efficiency covered by the current studies. Finally, the table emphasizes that every plant consists of many small operations and that improving efficiency requires change and adjustments in these small operations. Reducing shipping-point costs will result from a step-by-step approach and the combination of these steps into well-integrated totals, not from some single sweeping adjustment.

The major objectives of the studies of packing-house costs are to identify differences in costs in the component activities of plant operation and to determine the factors responsible for such differences. The results of these studies may then be applied to the problems of improving efficiency for individual houses and for the industry as a whole.

Reports for Packing House Managers

Improved efficiency in the operation of packing houses must, of course, stem from the decisions and actions of the owners and managers of these facilities. To make the best possible decisions, managers need certain information. A typical manager of a packing house, for example, needs information on such things as: (1) labor, equipment, and supply requirements for his present methods of operation; (2) requirements for possible alternative methods; (3) probable length of his packing season and the pattern of receipts within the season; and (4) present and future characteristics of the local supply of labor and other factors in terms of availability, prices, and wages. In other words, he needs to understand how his plant operates,

what changes in efficiency could be expected from changes in methods, and the way in which these can be adapted to his peculiar local supply and labor situation.

Most packing-house managers have a good understanding of the requirements for their own plant--item (1) above--but there are occasional blind spots where operations are carried out in certain ways for no better reason than that they have "always been that way." Few managers have very definite information as to the probable effects of certain changes in operations on efficiency and costs--item (2)--for this requires familiarity with many methods and items of equipment not used in their plants. The local situation with respect to supplies of fruit, labor, and other factors--items (3) and (4)--should be better known to the local manager than to anyone else, but here his knowledge cannot be perfect. Weather conditions and the prices for fruit in nonfresh outlets have an important impact on the volume and timing of fruit receipts while the development of the seasons and alternative employments affect the labor supply available to the local packing house. As many of these things can be forecast imperfectly at best, the manager must operate with a considerable range of uncertainty.

The present report serves only as an introduction to a series of special reports designed to reduce uncertainty with respect to the first two of the above items and to suggest some ways in which the plant organization and operation can be adjusted to the unavoidable areas of uncertainty that remain. The reports that follow will compare house operations, methods, equipment, and arrangements in some detail. These comparisons will be used to establish standards for efficient operation to provide the managers with specific knowledge of alternative methods and adjustments that can be used to increase efficiency. Later reports will bring all of this information to bear on industrywide problems such as the efficient organization of packing and marketing operations for an entire area or region. As previously indicated, the present studies deal specifically with apple, pear, and grape packing in California. With minor modifications, however, the results can be applied to other states, and they have at least indirect application to many of the problems of packing and processing other fruits and vegetables.

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